

C L A I M S

1. A packet communication network
2 characterized by comprising a plurality of routers which
3 are connected in a network form through communication
4 links, and a plurality of route control servers each of
5 which is arranged in one of areas provided by dividing
6 the packet communication network and controls the router
7 in the area,
8 wherein said route control server comprises a
9 destination information acquisition unit which acquires
10 destination information of a packet from header
11 information of the packet, the header information being
12 sent from said router in the area, a route control unit
13 which generates inter-server information containing the
14 destination information acquired by said destination
15 information acquisition unit and transfer management
16 information made to correspond to the destination
17 information in advance, an inter-server information
18 transmission/reception unit which transmits/receives the
19 inter-server information to/from another route control
20 server, and a packet control unit which determines an
21 output interface of the packet in said router on the
22 basis of the destination information and transfer
23 management information and determines the output
24 interface of the packet on the basis of destination
25 information and transfer management information
26 contained in inter-server information from another route

27 control server, and
28 said router comprises a header information
29 acquisition unit which acquires the header information
30 from the arrival packet and notifies the route control
31 server of the acquired header information, and an output
32 interface control unit which outputs the arrival packet
33 from the output interface corresponding to the packet to
34 a communication link connected to the output interface
35 on the basis of the determination in said route control
36 server.

2. A packet communication network according
2 to claim 1, characterized by further comprising
3 a plurality of packet transfer apparatuses
4 each of which is provided in each area to store a
5 plurality of user terminals and connected to an optical
6 wavelength path of the photonic network, encapsulates,
7 in a lower layer frame, an upper layer packet received
8 from one of a user network which stores a transmission
9 source user terminal and an external network which
10 stores the transmission source user terminal and
11 transfers the lower layer frame, in transmitting the
12 lower layer frame to the external network, transfers the
13 lower layer frame after decapsulating the lower layer
14 frame to the upper layer packet, and executes mutual
15 conversion and transfer of an upper layer packet on a
16 side of a user terminal corresponding to an upper layer
17 packet address and a lower layer frame on a side of an

18 optical wavelength path corresponding to a lower layer
19 frame address on the basis of an address management
20 table which manages correspondence between the upper
21 layer packet address and the destination lower layer
22 frame address, and
23 an admission control server which is provided
24 in each area and sets, of optical wavelength paths of
25 the photonic network, an optical wavelength path to
26 connect packet transfer apparatuses of transmission
27 source and destination in accordance with an optical
28 wavelength path connection request received from the
29 transmission source user terminal through said packet
30 transfer apparatus,
31 wherein said router comprises a frame transfer
32 apparatus which is connected to the optical wavelength
33 path of the photonic network to receive the lower layer
34 frame from the transmission source packet transfer
35 apparatus and transfer the lower layer frame to a packet
36 transfer apparatus corresponding to the upper layer
37 packet address of the upper layer packet in the lower
38 layer frame, and
39 said admission control server comprises a
40 route setting function unit which, in setting the
41 optical wavelength path, registers correspondence
42 between the upper layer packet address of the user
43 terminal and the lower layer frame address corresponding
44 to the optical wavelength path in the address management

45 tables of the packet transfer apparatuses of the
46 transmission source and destination, sets, between the
47 packet transfer apparatuses of the transmission source
48 and destination, an optical wavelength path formed from
49 a cut-through optical wavelength path which has a
50 guaranteed band and passes through only at least one
51 wavelength switch when a band guarantee request is
52 present, and sets an optical wavelength path which
53 connects the packet transfer apparatuses of the
54 transmission source and destination through said frame
55 transfer apparatus when no band guarantee request is
56 present.

3. A packet communication network according
2 to claim 2, characterized in that
3 said packet transfer apparatus manages
4 correspondence between a destination upper layer packet
5 address and a destination lower layer frame address in
6 the address management table, converts the upper layer
7 packet from the user terminal side into the lower layer
8 frame, and transfers the lower layer frame to the
9 optical wavelength path of the destination lower layer
10 frame address corresponding to the destination upper
11 layer packet address.

4. A packet communication network according
2 to claim 2, characterized in that
3 said packet transfer apparatus manages
4 correspondence between transmission source and

5 destination upper layer packet addresses and a
6 destination lower layer frame address in the address
7 management table, converts the upper layer packet from
8 the user terminal side into the lower layer frame, and
9 transfers the lower layer frame to the optical
10 wavelength path of the destination lower layer frame
11 address corresponding to the transmission source and
12 destination upper layer packet addresses.

5. A route control server which is arranged
2 in one of areas provided by dividing a packet
3 communication network including a plurality of routers,
4 characterized by comprising:
5 a destination information acquisition unit
6 which acquires destination information of a packet from
7 header information of the packet, the header information
8 being sent from the router in the area;
9 a route control unit which generates
10 inter-server information containing the destination
11 information acquired by said destination information
12 acquisition unit and transfer management information
13 made to correspond to the destination information in
14 advance;
15 an inter-server information
16 transmission/reception unit which transmits/receives the
17 inter-server information to/from another route control
18 server; and
19 a packet control unit which determines an

20 output interface of the packet in the router on the
21 basis of the destination information and transfer
22 management information,
23 wherein said packet control unit determines
24 the output interface of the packet on the basis of
25 destination information and transfer management
26 information contained in inter-server information from
27 another route control server.

6. A route control server according to claim
2 5, characterized in that in transmitting the
3 inter-server information, said inter-server information
4 transmission/reception unit transmits the inter-server
5 information to only a route control server in an area
6 through which the packet having the destination
7 information passes.

7. A route control server according to claim
2 5, characterized in that said packet control unit
3 determines the output interface of the packet having the
4 destination information on the basis of the destination
5 information and transfer management information
6 contained in the received inter-server information which
7 said inter-server information transmission/reception
8 unit has received from another route control server.

8. A route control server according to claim
2 7, characterized in that said packet control unit
3 determines the output interface related to the
4 destination information only when a subsequent area

5 through which the packet having the destination
6 information of the inter-server information passes is
7 present.

9. A route control server according to claim
2 5, characterized in that the transfer management
3 information contains information representing one of
4 priority and a size of a communication band in transfer
5 processing of the packet having the destination
6 information.

10. A route control method characterized by
2 comprising:
3 the header information acquisition step of
4 causing a plurality of routers which are connected in a
5 network form through communication links to form a
6 packet communication network to acquire header
7 information from an arrival packet and send the header
8 information to, of a plurality of route control servers
9 each of which is arranged in one of areas provided by
10 dividing the packet communication network and controls
11 the router in the area, a route control server
12 corresponding to the area of the router;
13 the destination information acquisition step
14 of causing the route control server to acquire
15 destination information of the packet from the header
16 information of the packet, the header information being
17 sent from the router in the area;
18 the route control step of causing the route

19 control server to generate inter-server information
20 containing the destination information acquired in the
21 destination information acquisition step and transfer
22 management information made to correspond to the
23 destination information in advance;
24 the inter-server information
25 transmission/reception step of causing the route control
26 server to transmit/receive the inter-server information
27 to/from another route control server;
28 the packet control step of causing the route
29 control server to determine an output interface of the
30 packet in the router on the basis of the destination
31 information and transfer management information and
32 determine the output interface of the packet on the
33 basis of destination information and transfer management
34 information contained in inter-server information from
35 another route control server; and
36 the output interface control step of causing
37 the router to output the arrival packet from the output
38 interface corresponding to the packet to a communication
39 link connected to the output interface on the basis of
40 the determination in the route control server.

11. A program which causes a computer of a
2 route control server which is arranged in one of areas
3 provided by dividing a packet communication network
4 including a plurality of routers and controls the router
5 in the area to execute:

6 the destination information acquisition step
7 of acquiring destination information of a packet from
8 header information of the packet, the header information
9 being sent from the router in the area;

10 the route control step of generating
11 inter-server information containing the destination
12 information acquired in the destination information
13 acquisition step and transfer management information
14 made to correspond to the destination information in
15 advance;

16 the inter-server information
17 transmission/reception step of transmitting/receiving
18 the inter-server information to/from another route
19 control server; and

20 the packet control step of determining an
21 output interface of the packet in the router on the
22 basis of the destination information and transfer
23 management information and determining the output
24 interface of the packet on the basis of destination
25 information and transfer management information
26 contained in inter-server information from another route
27 control server.

12. A recording medium which records a
2 program to cause a computer of a route control server
3 which is arranged in one of areas provided by dividing a
4 packet communication network including a plurality of
5 routers and controls the router in the area to execute:

6 the destination information acquisition step
7 of acquiring destination information of a packet from
8 header information of the packet, the header information
9 being sent from the router in the area;
10 the route control step of generating
11 inter-server information containing the destination
12 information acquired in the destination information
13 acquisition step and transfer management information
14 made to correspond to the destination information in
15 advance;
16 the inter-server information
17 transmission/reception step of transmitting/receiving
18 the inter-server information to/from another route
19 control server; and
20 the packet control step of determining an
21 output interface of the packet in the router on the
22 basis of the destination information and transfer
23 management information and determining the output
24 interface of the packet on the basis of destination
25 information and transfer management information
26 contained in inter-server information from another route
27 control server.

13. A packet communication network

2 characterized by comprising:

3 a plurality of packet transfer apparatuses
4 each of which stores a plurality of user terminals, is
5 connected to an optical wavelength path of a photonic

6 network including a transmission link having an optical
7 wavelength path multiplex transmission function and a
8 wavelength switch having an optical wavelength path
9 switching function, encapsulates, in a lower layer
10 frame, an upper layer packet received from one of a user
11 network which stores a transmission source user terminal
12 and an external network which stores the transmission
13 source user terminal and transfers the lower layer
14 frame, in transmitting the lower layer frame to the
15 external network, transfers the lower layer frame after
16 decapsulating the lower layer frame to the upper layer
17 packet, and executes mutual conversion and transfer of
18 an upper layer packet on a side of a user terminal
19 corresponding to an upper layer packet address and a
20 lower layer frame on a side of an optical wavelength
21 path corresponding to a lower layer frame address on the
22 basis of an address management table which manages
23 correspondence between the upper layer packet address
24 and the destination lower layer frame address;

25 an admission control server which sets, of
26 optical wavelength paths of the photonic network, an
27 optical wavelength path to connect packet transfer
28 apparatuses of transmission source and destination in
29 accordance with an optical wavelength path connection
30 request received from the transmission source user
31 terminal through said packet transfer apparatus; and
32 a frame transfer apparatus which is connected

33 to the optical wavelength path of the photonic network
34 to receive the lower layer frame from the transmission
35 source packet transfer apparatus and transfer the lower
36 layer frame to a packet transfer apparatus corresponding
37 to the upper layer packet address of the upper layer
38 packet in the lower layer frame,

39 wherein said admission control server
40 comprises a route setting function unit which, in
41 setting the optical wavelength path, registers
42 correspondence between the upper layer packet address of
43 the user terminal and the lower layer frame address
44 corresponding to the optical wavelength path in the
45 address management tables of the packet transfer
46 apparatuses of the transmission source and destination,
47 sets, between the packet transfer apparatuses of the
48 transmission source and destination, an optical
49 wavelength path formed from a cut-through optical
50 wavelength path which has a guaranteed band and passes
51 through only at least one wavelength switch when a band
52 guarantee request is present, and sets an optical
53 wavelength path which connects the packet transfer
54 apparatuses of the transmission source and destination
55 through said frame transfer apparatus when no band
56 guarantee request is present.

 14. A packet communication network according
2 to claim 13, characterized in that
3 said packet transfer apparatus manages

4 correspondence between a destination upper layer packet
5 address and a destination lower layer frame address in
6 the address management table, converts the upper layer
7 packet from the user terminal side into the lower layer
8 frame, and transfers the lower layer frame to the
9 optical wavelength path of the destination lower layer
10 frame address corresponding to the destination upper
11 layer packet address.

15. A packet communication network according
2 to claim 13, characterized in that
3 said packet transfer apparatus manages
4 correspondence between transmission source and
5 destination upper layer packet addresses and a
6 destination lower layer frame address in the address
7 management table, converts the upper layer packet from
8 the user terminal side into the lower layer frame, and
9 transfers the lower layer frame to the optical
10 wavelength path of the destination lower layer frame
11 address corresponding to the transmission source and
12 destination upper layer packet addresses.

16. A packet transfer apparatus characterized
2 in that said apparatus is used in a packet communication
3 network formed from a network logically built on a
4 photonic network including a transmission link having an
5 optical wavelength path multiplex transmission function
6 and a wavelength switch having an optical wavelength
7 path switching function, the packet communication

8 network comprising an admission control server which
9 sets, of optical wavelength paths of the photonic
10 network, one of an optical wavelength path formed from a
11 cut-through optical wavelength path which has a
12 guaranteed band and connects packet transfer apparatuses
13 of transmission source and destination through only at
14 least one wavelength switch and an optical wavelength
15 path which connects the packet transfer apparatuses
16 through a frame transfer apparatus in accordance with an
17 optical wavelength path connection request received from
18 the transmission source user terminal through the packet
19 transfer apparatus, and comprises:

20 a forwarding processing unit which manages
21 correspondence between a destination upper layer packet
22 address and a destination lower layer frame address and
23 executes mutual conversion of a destination address of a
24 received packet between an upper layer and a lower layer
25 on the basis of an address management table in which
26 correspondence between an upper layer packet address of
27 a user terminal which is stored in the packet transfer
28 apparatus and a lower layer frame address corresponding
29 to the optical wavelength path is registered in
30 accordance with setting of the optical wavelength path
31 from the admission control server;

32 a packet processing unit which encapsulates
33 the upper layer packet received from the user terminal
34 in the lower layer frame and decapsulates the lower

35 layer frame received from the optical wavelength path to
36 the upper layer packet; and
37 a transmission frame processing unit which
38 transfers the packet encapsulated by said packet
39 processing unit to the optical wavelength path
40 corresponding to the destination lower layer frame
41 address obtained by said forwarding processing unit and
42 transfers the packet decapsulated by said packet
43 processing unit to the user terminal of the destination
44 upper layer packet address obtained by said forwarding
45 processing unit.

17. A packet transfer apparatus according to
2 claim 16, characterized in that
3 said forwarding processing unit uses, as the
4 address management table, an address management table in
5 which correspondence between the upper layer packet
6 address of a destination user terminal and the lower
7 layer frame address corresponding to the optical
8 wavelength path is registered in accordance with setting
9 of the optical wavelength path from the admission
10 control server, and
11 said transmission frame processing unit
12 transfers the lower layer frame obtained by
13 encapsulating the upper layer packet from the user
14 terminal side to the optical wavelength path of the
15 destination lower layer frame address obtained from the
16 address management table in correspondence with the

17 destination upper layer packet address.

18. A packet transfer apparatus according to
2 claim 16, characterized in that
3 said forwarding processing unit uses, as the
4 address management table, an address management table in
5 which correspondence between the upper layer packet
6 addresses of transmission source and destination user
7 terminals and the lower layer frame address
8 corresponding to the optical wavelength path is
9 registered in accordance with setting of the optical
10 wavelength path from the admission control server, and
11 said transmission frame processing unit
12 transfers the lower layer frame obtained by
13 encapsulating the upper layer packet from the user
14 terminal side to the optical wavelength path of the
15 destination lower layer frame address obtained from the
16 address management table in correspondence with the
17 transmission source and destination upper layer packet
18 addresses.

19. An admission control server characterized
2 in that said admission control server is used in a
3 packet communication network formed from a network
4 logically built on a photonic network including a
5 transmission link having an optical wavelength path
6 multiplex transmission function and a wavelength switch
7 having an optical wavelength path switching function,
8 the packet communication network comprising a packet

9 transfer apparatus which stores a plurality of user
10 terminals, is connected to an optical wavelength path of
11 the photonic network, and executes mutual conversion and
12 transfer of an upper layer packet on a side of a user
13 terminal corresponding to an upper layer packet address
14 and a lower layer frame on a side of an optical
15 wavelength path corresponding to a lower layer frame
16 address on the basis of an address management table
17 which manages correspondence between the upper layer
18 packet address and the destination lower layer frame
19 address, and comprises:

20 a route setting function unit which sets, of
21 optical wavelength paths of the photonic network, an
22 optical wavelength path formed from a cut-through
23 optical wavelength path which has a guaranteed band and
24 directly connects packet transfer apparatuses of
25 transmission source and destination in accordance with
26 an optical wavelength path connection request received
27 from the transmission source user terminal through the
28 packet transfer apparatus; and

29 an external device management function unit
30 which registers correspondence between the upper layer
31 packet address of the user terminal and the lower layer
32 frame address corresponding to the optical wavelength
33 path in the address management tables of the packet
34 transfer apparatuses of the transmission source and
35 destination in setting the optical wavelength path.

20. An admission control server according to
2 claim 19, characterized in that in setting the optical
3 wavelength path, said route setting function unit sets
4 the optical wavelength path formed from the cut-through
5 optical wavelength path between the packet transfer
6 apparatuses of the transmission source and destination
7 when a band guarantee request is present and sets an
8 optical wavelength path which connects the packet
9 transfer apparatuses of the transmission source and
10 destination through a frame transfer apparatus to
11 transfer the lower layer frame through the photonic
12 network when no band guarantee request is present.

21. An admission control server according to
2 claim 19, characterized by further comprising an optical
3 wavelength path setting determination function unit
4 which confirms presence/absence of the band guarantee
5 request by referring to contract user information of a
6 band guarantee service, which is registered in
7 correspondence with each user terminal in advance, on
8 the basis of the transmission source upper layer packet
9 address of the transmission source user terminal
10 contained in the optical wavelength path connection
11 request.

22. An admission control server according to
2 claim 19, characterized by further comprising a
3 destination packet transfer apparatus specifying table
4 which guides, from the destination upper layer packet

5 address, a destination lower layer frame address prefix
6 representing the destination packet transfer apparatus
7 which stores a user terminal having the address,
8 wherein said route setting function unit
9 specifies the transmission source packet transfer
10 apparatus on the basis of the transmission source lower
11 layer frame address prefix contained in the optical
12 wavelength path connection request, specifies the
13 destination packet transfer apparatus on the basis of
14 the destination upper layer packet address contained in
15 the optical wavelength path connection request by
16 looking up said destination packet transfer apparatus
17 specifying table, and sets the cut-through optical
18 wavelength path between the transmission source packet
19 transfer apparatus and the destination packet transfer
20 apparatus by controlling the transmission source packet
21 transfer apparatus, the destination packet transfer
22 apparatus, and the wavelength switch of the photonic
23 network.

23. An admission control server according to
2 claim 19, characterized in that in setting the optical
3 wavelength path, by transmitting a table control packet
4 to the packet transfer apparatus, said external device
5 management function unit adds, to the address management
6 table of the packet transfer apparatus, a destination
7 lower layer frame address which corresponds to the
8 destination upper layer packet address and contains a

9 lower layer frame address prefix representing the
10 destination packet transfer apparatus and an identifier
11 representing an optical wavelength path to be used.

24. An admission control server according to
2 claim 19, characterized in that in setting the optical
3 wavelength path, said external device management
4 function unit adds, to the address management table of
5 the packet transfer apparatus, a destination lower layer
6 frame address which corresponds to the transmission
7 source and destination upper layer packet addresses and
8 contains a lower layer frame address prefix representing
9 the destination packet transfer apparatus and an
10 identifier representing an optical wavelength path to be
11 used by transmitting a table control packet to the
12 packet transfer apparatus.

25. An optical wavelength path setting method
2 characterized by comprising:
3 the step of causing a plurality of packet
4 transfer apparatuses each of which stores a plurality of
5 user terminals and is connected to an optical wavelength
6 path of a photonic network including a transmission link
7 having an optical wavelength path multiplex transmission
8 function and a wavelength switch having an optical
9 wavelength path switching function to encapsulate, in a
10 lower layer frame, an upper layer packet received from
11 one of a user network which stores a transmission source
12 user terminal and an external network which stores the

13 transmission source user terminal and transfer the lower
14 layer frame, in transmitting the lower layer frame to
15 the external network, transfer the lower layer frame
16 after decapsulating the lower layer frame to the upper
17 layer packet, and execute mutual conversion and transfer
18 of an upper layer packet on a side of a user terminal
19 corresponding to an upper layer packet address and a
20 lower layer frame on a side of an optical wavelength
21 path corresponding to a lower layer frame address on the
22 basis of an address management table which manages
23 correspondence between the upper layer packet address
24 and the destination lower layer frame address;

25 the step of causing a frame transfer apparatus
26 which is connected to the optical wavelength path of the
27 photonic network to receive the lower layer frame from
28 the transmission source packet transfer apparatus and
29 transfer the lower layer frame to a packet transfer
30 apparatus corresponding to the upper layer packet
31 address of the upper layer packet in the lower layer
32 frame;

33 the step of causing an admission control
34 server which is connected to the wavelength switch, the
35 packet transfer apparatus, and the frame transfer
36 apparatus to set, of optical wavelength paths of the
37 photonic network, an optical wavelength path to connect
38 packet transfer apparatuses of transmission source and
39 destination in accordance with an optical wavelength

40 path connection request received from the transmission
41 source user terminal through the packet transfer
42 apparatus; and
43 the route setting function step of, in setting
44 the optical wavelength path, causing the admission
45 control server to register correspondence between the
46 upper layer packet address of the user terminal and the
47 lower layer frame address corresponding to the optical
48 wavelength path in the address management tables of the
49 packet transfer apparatuses of the transmission source
50 and destination, set, between the packet transfer
51 apparatuses of the transmission source and destination,
52 an optical wavelength path formed from a cut-through
53 optical wavelength path which has a guaranteed band and
54 passes through only at least one wavelength switch when
55 a band guarantee request is present, and set an optical
56 wavelength path which connects the packet transfer
57 apparatuses of the transmission source and destination
58 through the frame transfer apparatus when no band
59 guarantee request is present.

26. A program which causes a computer of a
2 packet transfer apparatus provided in a packet
3 communication network formed from a network logically
4 built on a photonic network including a transmission
5 link having an optical wavelength path multiplex
6 transmission function and a wavelength switch having an
7 optical wavelength path switching function, the packet

8 communication network comprising an admission control
9 server which sets, of optical wavelength paths of the
10 photonic network, one of an optical wavelength path
11 formed from a cut-through optical wavelength path which
12 has a guaranteed band and connects packet transfer
13 apparatuses of transmission source and destination
14 through only at least one wavelength switch and an
15 optical wavelength path which connects the packet
16 transfer apparatuses through a frame transfer apparatus
17 in accordance with an optical wavelength path connection
18 request received from the transmission source user
19 terminal through the packet transfer apparatus, to
20 execute:

21 the forwarding processing step of managing
22 correspondence between a destination upper layer packet
23 address and a destination lower layer frame address and
24 executing mutual conversion of a destination address of
25 a received packet between an upper layer and a lower
26 layer on the basis of an address management table in
27 which correspondence between an upper layer packet
28 address of a user terminal which is stored in the packet
29 transfer apparatus and a lower layer frame address
30 corresponding to the optical wavelength path is
31 registered in accordance with setting of the optical
32 wavelength path from the admission control server;
33 the packet processing step of encapsulating
34 the upper layer packet received from the user terminal

35 in the lower layer frame and decapsulating the lower
36 layer frame received from the optical wavelength path to
37 the upper layer packet; and
38 the transmission frame processing step of
39 transferring the packet encapsulated in the packet
40 processing step to the optical wavelength path
41 corresponding to the destination lower layer frame
42 address obtained in the forwarding processing step and
43 transferring the packet decapsulated in the packet
44 processing step to the user terminal of the destination
45 upper layer packet address obtained in the forwarding
46 processing step.

27. A program which causes a computer of an
2 admission control server provided in a packet
3 communication network formed from a network logically
4 built on a photonic network including a transmission
5 link having an optical wavelength path multiplex
6 transmission function and a wavelength switch having an
7 optical wavelength path switching function, the packet
8 communication network comprising a packet transfer
9 apparatus which stores a plurality of user terminals, is
10 connected to an optical wavelength path of the photonic
11 network, and executes mutual conversion and transfer of
12 an upper layer packet on a side of a user terminal
13 corresponding to an upper layer packet address and a
14 lower layer frame on a side of an optical wavelength
15 path corresponding to a lower layer frame address on the

16 basis of an address management table which manages
17 correspondence between the upper layer packet address
18 and the destination lower layer frame address, to
19 execute:

20 the route setting function step of setting, of
21 optical wavelength paths of the photonic network, an
22 optical wavelength path formed from a cut-through
23 optical wavelength path which has a guaranteed band and
24 directly connects packet transfer apparatuses of
25 transmission source and destination in accordance with
26 an optical wavelength path connection request received
27 from the transmission source user terminal through the
28 packet transfer apparatus; and

29 the external device management function step
30 of registering correspondence between the upper layer
31 packet address of the user terminal and the lower layer
32 frame address corresponding to the optical wavelength
33 path in the address management tables of the packet
34 transfer apparatuses of the transmission source and
35 destination in setting the optical wavelength path.

28. A recording medium which records a
2 program to cause a computer of a packet transfer
3 apparatus provided in a packet communication network
4 formed from a network logically built on a photonic
5 network including a transmission link having an optical
6 wavelength path multiplex transmission function and a
7 wavelength switch having an optical wavelength path

8 switching function, the packet communication network
9 comprising an admission control server which sets, of
10 optical wavelength paths of the photonic network, one of
11 an optical wavelength path formed from a cut-through
12 optical wavelength path which has a guaranteed band and
13 connects packet transfer apparatuses of transmission
14 source and destination through only at least one
15 wavelength switch and an optical wavelength path which
16 connects the packet transfer apparatuses through a frame
17 transfer apparatus in accordance with an optical
18 wavelength path connection request received from the
19 transmission source user terminal through the packet
20 transfer apparatus, to execute:

21 the forwarding processing step of managing
22 correspondence between a destination upper layer packet
23 address and a destination lower layer frame address and
24 executing mutual conversion of a destination address of
25 a received packet between an upper layer and a lower
26 layer on the basis of an address management table in
27 which correspondence between an upper layer packet
28 address of a user terminal which is stored in the packet
29 transfer apparatus and a lower layer frame address
30 corresponding to the optical wavelength path is
31 registered in accordance with setting of the optical
32 wavelength path from the admission control server;
33 the packet processing step of encapsulating
34 the upper layer packet received from the user terminal

35 in the lower layer frame and decapsulating the lower
36 layer frame received from the optical wavelength path to
37 the upper layer packet; and
38 the transmission frame processing step of
39 transferring the packet encapsulated in the packet
40 processing step to the optical wavelength path
41 corresponding to the destination lower layer frame
42 address obtained in the forwarding processing step and
43 transferring the packet decapsulated in the packet
44 processing step to the user terminal of the destination
45 upper layer packet address obtained in the forwarding
46 processing step.

29. A recording medium which stores a program
2 to cause a computer of an admission control server
3 provided in a packet communication network formed from a
4 network logically built on a photonic network including
5 a transmission link having an optical wavelength path
6 multiplex transmission function and a wavelength switch
7 having an optical wavelength path switching function,
8 the packet communication network comprising a packet
9 transfer apparatus which stores a plurality of user
10 terminals, is connected to an optical wavelength path of
11 the photonic network, and executes mutual conversion and
12 transfer of an upper layer packet on a side of a user
13 terminal corresponding to an upper layer packet address
14 and a lower layer frame on a side of an optical
15 wavelength path corresponding to a lower layer frame

16 address on the basis of an address management table
17 which manages correspondence between the upper layer
18 packet address and the destination lower layer frame
19 address, to execute:
20 the route setting function step of setting, of
21 optical wavelength paths of the photonic network, an
22 optical wavelength path formed from a cut-through
23 optical wavelength path which has a guaranteed band and
24 directly connects packet transfer apparatuses of
25 transmission source and destination in accordance with
26 an optical wavelength path connection request received
27 from the transmission source user terminal through the
28 packet transfer apparatus; and
29 the external device management function step
30 of registering correspondence between the upper layer
31 packet address of the user terminal and the lower layer
32 frame address corresponding to the optical wavelength
33 path in the address management tables of the packet
34 transfer apparatuses of the transmission source and
35 destination in setting the optical wavelength path.